

### AMENDMENTS TO THE CLAIMS

Following is a listing of all claims in the present application, which listing supersedes all previously presented claims:

#### Listing of Claims:

1. (Currently Amended) A method for manufacturing a magnetic field detecting element ~~consisting of~~ having a soft magnetic core formed on a semiconductor substrate~~[[; a]],~~ first and ~~[[a]]~~ second coils arranged on ~~[[an]]~~ upper and ~~[[a]]~~ lower ~~[[parts]]~~ surfaces of the soft magnetic core, respectively, the first and second coils each having a plurality of coil lines, ~~respectively,~~ the method comprising ~~the steps of:~~
  - forming a seed film ~~[[of]]~~ to a predetermined thickness on the semiconductor substrate;
  - removing a portion of the seed film using a predetermined pattern so that ~~[[a]]~~ each of the plurality of ~~[[the]]~~ coil lines constituting the first coil that ~~would-be~~ is subsequently formed on a remaining portion of the seed film ~~may-be partitioned each other~~ is separated from the others;
  - forming a first plating mold having a plurality of grooves ~~that corresponds~~ corresponding to the predetermined pattern, on an upper ~~[[part]]~~ portion of the seed film;
  - forming ~~[[a]]~~ the plurality of ~~[[the]]~~ coil lines constituting the first coil by filling ~~up metal~~ in the groove plurality of grooves of the first plating mold with metal;
  - forming ~~[[a]]~~ the soft magnetic core and the second coil on an upper ~~[[part]]~~ portion of the semiconductor substrate and on the remaining portion of the seed film where the first coil is formed; and
  - cutting off ~~[[four]]~~ edges of the semiconductor substrate so that ~~[[a]]~~ each of the plurality of ~~[[the]]~~ coil lines ~~partitioned~~ separated by the predetermined pattern ~~may-be~~ are insulated from each other.

2. (Currently Amended) The method ~~according to~~ as claimed in claim 1, wherein the ~~step of removing the portion of~~ the seed film further comprises: ~~the steps of: spreading~~ forming a photoresist layer on an upper surface of the seed film; ~~forming a predetermined pattern that would be removed,~~ by exposing and developing the photoresist to form the predetermined pattern; and etching the seed film according to the predetermined pattern.

3. (Currently Amended) The method ~~according to~~ as claimed in claim 1, wherein ~~metal is filled up in the groove~~ filling the plurality of grooves of the first plating mold ~~by means of an~~ with metal comprises electric plating.

4. (Currently Amended) The method ~~according to~~ as claimed in claim 1, wherein the ~~step of forming the soft magnetic core further comprises the steps of:~~

~~performing planarization of~~ planarizing an upper surface of the semiconductor substrate on which the first coil is formed;

spreading an insulating film on ~~[[an]]~~ the planarized upper surface of the semiconductor substrate ~~for which planarization has been performed;~~

spreading a soft magnetic material film on an upper ~~[[part]]~~ surface of the insulating film;

forming a ~~pattern of the soft magnetic core through exposing and developing processes~~  
~~after spreading a~~ photoresist layer on the soft magnetic material film and exposing and  
developing the photoresist layer to form a pattern of the soft magnetic core; and

etching the soft magnetic material film according to the pattern.

5. (Currently Amended) The method ~~according to~~ as claimed in claim 1, wherein ~~the step of forming the soft magnetic core further comprises the steps of:~~

removing the first plating mold;

~~spreading~~ forming an insulating film ~~[[at]]~~ to a height ~~higher~~ greater than a height of the first coil~~[[,]]~~ on an upper ~~[[part]]~~ surface of the semiconductor substrate from which the first plating mold has been removed;

spreading a soft magnetic material film on an upper ~~[[part]]~~ surface of the insulating film;

~~forming a soft magnetic core pattern through exposing and developing processes after~~  
spreading a photoresist layer on the soft magnetic material film and exposing and developing the photoresist layer to form a pattern of the soft magnetic core; and

etching the soft magnetic material film according to the pattern.

6. (Currently Amended) A method for manufacturing a magnetic field detecting element ~~consisting of~~ having a soft magnetic core formed on a semiconductor substrate, ~~and a~~ first and ~~[[a]]~~ second coils respectively arranged on ~~[[an]]~~ upper and ~~[[a]]~~ lower ~~[[parts]]~~ surfaces of the soft magnetic core, ~~[[and]]~~ the first and second coils each having a plurality of coil lines, ~~respectively;~~ the method comprising ~~the steps of:~~

forming a first seed film ~~[[of]]~~ to a predetermined thickness on the semiconductor substrate;

removing a portion of the first seed film using a predetermined first pattern so that ~~[[a]]~~ each of the plurality of coil lines constituting the first coil ~~that would to be~~ subsequently formed on the first seed film ~~may be partitioned each other~~ is separated from the others;

forming a first plating mold having a plurality of grooves that corresponds to the predetermined first pattern, on an upper ~~[[part]]~~ portion of the first seed film;

forming ~~[[a]]~~ the plurality of coil lines constituting the first coil by filling ~~up metal in the~~  
~~groove~~ the plurality of grooves of the first plating mold with metal;

forming ~~[[a]]~~ the soft magnetic core on the semiconductor substrate where the first coil is  
formed;

forming a second insulating film on the semiconductor substrate where the soft magnetic  
core is formed;

forming a second seed film on an upper surface of the second insulating film;

removing the second seed film using a predetermined second pattern so that a plurality of  
coil lines constituting the second coil ~~that would to be~~ subsequently formed on the second seed  
film ~~may be partitioned~~ are separated from each other;

forming a second plating mold having a plurality of grooves ~~that corresponds~~  
corresponding to the second pattern, on an upper ~~[[part]]~~ portion of the second seed film;

forming a plurality of coil lines constituting the second coil by filling ~~up metal in the~~  
plurality of grooves ~~groove~~ of the second plating mold with metal; and

cutting off edges on ~~[[four]]~~ sides of the semiconductor substrate so that ~~[[a]]~~ each of the  
plurality of ~~[[the]]~~ coil lines constituting the first and the second coils ~~partitioned~~ separated by  
the first and the second patterns ~~may be~~ are insulated from each other.

7. (Currently Amended) The method ~~according to~~ as claimed in claim 6, wherein  
~~metal is filled up in~~ filling the plurality of grooves of the first and the second plating molds with  
metal comprises ~~by means of an~~ electric plating.

8. (Currently Amended) The method ~~according to~~ as claimed in claim 6, wherein the ~~step of forming the soft magnetic core further comprises the steps of:~~

~~performing planarization of~~ planarizing an upper surface of the semiconductor substrate on which the first coil is formed;

spreading a first insulating film on ~~[[an]]~~ the planarized upper surface of the semiconductor substrate ~~for which planarization has been performed;~~

spreading a soft magnetic material film on an upper ~~[[part]]~~ portion of the first insulating film;

~~forming a soft magnetic core pattern through exposing and developing processes after spreading a photoresist layer on the soft magnetic material film and exposing and developing the photoresist layer to form a pattern of the soft magnetic core; and~~

etching the soft magnetic material film according to the pattern.

9. (Currently Amended) A method for manufacturing a magnetic field detecting element, ~~including the steps of:~~ comprising:

forming a well to a predetermined depth in a semiconductor substrate;

forming a first coil on ~~an upper part of a~~ the semiconductor substrate, the first coil being arranged within the well below an upper surface of the semiconductor substrate;

~~after~~ forming a first insulating film on an upper portion of the first coil and forming a soft magnetic core on an upper ~~[[part]]~~ portion of the first coil ~~with an insulating film intervened~~ [[,]];

forming a second insulating film on an upper portion of the soft magnetic core; and

forming a second coil on an upper ~~[[part]]~~ portion of the soft magnetic core ~~with another second insulating film intervened, the method comprising the step of:~~

~~after forming a well of a predetermined dept on the semiconductor substrate, arranging the first coil in an inside of the well lest the first coil should be projected to a surface of the semiconductor substrate.~~

10. (Currently Amended) A method for manufacturing a magnetic field detecting element, comprising ~~the steps of:~~

preparing a semiconductor substrate;

forming a well ~~[[of]]~~ to a predetermined ~~dept on~~ depth in the semiconductor substrate;

forming a first coil consisting of a plurality of coil lines ~~in an inside of~~ within the well of the semiconductor substrate;

forming a first insulating film on an upper ~~[[part]]~~ portion of the semiconductor substrate including the well;

forming a soft magnetic core on an upper ~~[[part]]~~ portion of the first insulating film;

forming a second insulating film on an upper ~~[[part]]~~ portion of the first insulating film including the soft magnetic core; and

forming a second coil ~~that corresponds~~ corresponding to the first coil, on an upper ~~[[part]]~~ portion of the second insulating film.

11. (Currently Amended) The method ~~according to~~ as claimed in claim 10, wherein forming the well comprises etching inner sidewalls of the well to be ~~is formed in such a way that the well has an inclined sidewall that is gradually inclined in its inside~~ from ~~[[its]]~~ an upper ~~[[part]]~~ portion of the well to ~~[[its]]~~ a bottom ~~by the etching process~~ of the well.

12. (Currently Amended) The method ~~according to~~ as claimed in claim 10, wherein ~~the step of forming the first coil further comprises the steps of:~~

forming a first seed film on a surface of the well;

forming a first plating mold having a plurality of grooves on the first seed film;

forming a plurality of coil lines constituting the first coil by filling the plurality of grooves ~~up metal in each groove~~ of the first plating mold with metal; and

removing the first plating mold and the first seed film under the first plating mold.

13. (Currently Amended) The method ~~according to~~ as claimed in claim 12, wherein filling the plurality of grooves ~~metal is filled up in each groove~~ of the first plating mold with metal ~~by means of an~~ comprises electric plating.

14. (Currently Amended) The method ~~according to~~ as claimed in claim 10, wherein ~~the step of forming the second coil further comprises the steps of:~~

forming a via hole by etching the first and ~~[[the]]~~ second insulating films on both sides of the soft magnetic core;

forming a second seed film on an upper surface of the second insulating film ~~[[on]]~~ in which the via hole is formed;

forming a second plating mold having a plurality of grooves~~[[,]]~~ on the second seed film;

forming a plurality of coil lines constituting a second coil by filling the plurality of grooves ~~up metal in each groove~~ of the second plating mold~~[[,]]~~ with metal and connecting the first coil with the second coil through the via hole; and

removing the second plating mold and the second seed film under the second plating mold.

15. (Currently Amended) The method ~~according to~~ as claimed in claim 14, wherein ~~filling the plurality of grooves metal is filled up in each groove~~ of the second plating mold with metal ~~by means of an~~ comprises electric plating.

16. (Currently Amended) The method ~~according to~~ as claimed in claim 10, further comprising ~~the step of forming a protection film on the semiconductor substrate for protecting structures including the second coil to protect a structure formed thereon.~~

17. (Currently Amended) A magnetic field detecting element, comprising:  
a semiconductor substrate;  
a soft magnetic core formed on an upper ~~[[part]]~~ portion of the semiconductor substrate;  
an insulating film positioned on an upper and a lower ~~[[parts]]~~ portions of the soft magnetic core; and

~~[[a]] first and [[a]] second coils, each including a plurality of coil lines, formed in such a way that those coils to~~ enclose the soft magnetic core with the soft magnetic core and the insulating film intervened, and having a plurality of coil lines, respectively intervening therebetween,

wherein a well of a predetermined ~~[[dept]]~~ depth is formed ~~[[on]]~~ in the semiconductor substrate and the plurality of coil lines constituting the first coil are arranged ~~in an inside of~~ within the well.

18. (Currently Amended) The element ~~according to~~ as claimed in claim 17, wherein a height of the coil lines and a ~~[[dept]]~~ depth of the well are the same.



19. (Currently Amended) The element ~~according to~~ as claimed in claim 17, wherein the first coil is positioned at a lower ~~[[part]]~~ portion of the soft magnetic core and the second coil is positioned at an upper ~~[[part]]~~ portion of the soft magnetic core, and the plurality of coil lines of the first and ~~[[the]]~~ second coils are connected by ~~means of~~ a third coil ~~filled in the~~ filling a via hole formed ~~by passing~~ through the insulating film on both sides of the soft magnetic core.

20. (Currently Amended) The element ~~according to~~ as claimed in claim 17, wherein inner sidewalls of the well ~~has an inclined sidewall that is~~ are gradually inclined ~~in its inside~~ from ~~[[its]]~~ an upper ~~[[part]]~~ portion of the well to ~~[[its]]~~ a bottom of the well.